

IN THE CLAIMS:

1. (Currently Amended) Programmable adapter device for communicating between a higher level communication protocol supported by a higher level equipment and at least one lower level communication protocol supported by a lower level automation equipment, the device comprising an adapter comprising a processing unit for executing program instructions, a first higher level interface for connecting with a second higher level interface in such higher level equipment, and a first lower level interface for connecting with a second lower level interface in such lower level equipment, the adapter comprising:

~~a first memory for storing a conversion program for converting between the higher level protocol and a lower level protocol, after being downloaded from a higher level equipment, and for being executed by the processing unit,~~

~~a second non-volatile memory containing a resident driver program for execution by the processing unit to initialize communication with the higher level equipment using the higher level communication protocol and to subsequently request download of the conversion program from the higher level equipment into the first memory~~

a first memory,

a second non-volatile memory,

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a processing unit,

initialization means for requesting a download into the first memory of a conversion program stored on a higher level equipment, the higher level equipment being external to the adapter, the conversion program for converting between the higher level protocol and a lower level protocol, the initialization means being stored in the second non-volatile memory for execution by the processing unit,

download means for downloading to the adapter for storage in the first memory the conversion program stored on the higher level equipment, and

a processing unit for executing the conversion program.

2. (Previously Presented) The adapter device according to claim 1, wherein the first memory is a volatile memory.

3. (Previously Presented) The adapter device according to claim 2, wherein the first memory comprises a buffer memory area for use by the conversion program to adapt to asynchronism between the higher level and lower level protocols.

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4. (Previously Presented) The adapter device according to claim 3, wherein the conversion program is for storing messages received from a lower level equipment in the buffer memory area before passing such messages onto a higher level equipment.

5. (Previously Presented) The adapter device according to claim 3, wherein the conversion program is for storing messages received from the higher level equipment in the buffer memory area before passing such messages onto a lower level equipment.

6. (Previously Presented) The adapter device according to claim 1, further comprising a lower level connecting cable connecting the lower level interface of the adapter with the lower level interface of a lower level equipment, wherein the lower level connecting cable comprises integrated recognition means, detectable when the cable is connected to the lower level interface of the adapter, enabling the processing unit of the adapter to determine a complete identifier or a partial identifier of the lower level protocol using the resident driver program.

7. (Previously Presented) The adapter device according to claim 6, wherein the complete identifier or the partial identifier of the lower level protocol is stored in the first memory of the adapter.

8. (Currently Amended) The adapter device according to claim 1 in combination with a higher level equipment, ~~additional~~ additionally comprising a storage area for storing at least one conversion program for communicating between a higher level protocol and a lower level protocol, and for downloading said program into the first memory of the adapter.

9. (Previously Presented) The adapter device according to claim 8, wherein the higher level equipment comprises at least one lower level protocol driver and at least one peripheral driver supporting a serial communication interface, such that the lower level protocol driver is for communicating with the peripheral driver through said serial communication interface.

10. (Previously Presented) The adapter device according to claim 9, wherein the peripheral driver of a higher level equipment is for using different communication channels as a function of the criticality of messages being transmitted, to exchange messages with ~~the~~ a resident driver program.

11. (Previously Presented) The adapter device according to claim 1, wherein the higher level communication protocol is the USB protocol.

12. (Previously Presented) The adapter device according to claim 11, wherein the adapter comprises a USB interface for communicating with the higher level equipment.

13. (Previously Presented) The adapter device according to claim 1, wherein the higher level communication protocol is the BLUETOOTH protocol.

14. (Previously Presented) The adapter device according to claim 1, wherein the higher level communication protocol is a protocol in conformance with the IEEE 1394-1995 standard.

15. (Currently Amended) The adapter device according to claim 1, wherein the lower level communication protocol is selected from the group consisting of ~~is one of the~~ ModBus, ModBus+, and Uni-Telway, and has a protocol selected from the group consisting of ~~and a~~ ~~protocol using an~~ RS-232, RS-485, RS-422 ~~or~~ , and current loop as a physical layer.

16. (Previously Presented) The adapter device according to claim 1, wherein the lower level communication protocol is a protocol based on the Ethernet and TCP/IP standards.

17. (Previously Presented) The adapter device according to claim 1, wherein the lower level communication protocol is selected from the group consisting of the FIP, CAN, CANopen, Interbus-S, and DeviceNet protocols.

18. (Previously Presented) The adapter device according to claim 1, wherein the lower level communication protocol is a communication protocol based on the USB protocol.

19. (Currently Amended) A configuration process used in a programmable adapter device for communicating between a higher level communication protocol supported by a higher level equipment and at least one lower level communication protocol supported by a lower level automation equipment, the device comprising an adapter comprising a processing unit for executing program instructions, a first higher level interface for connecting with a second higher level interface in such higher level equipment, and a first lower level interface for connecting with a second lower level interface in such lower level equipment, wherein:

the adapter comprises:

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a first memory,

a second non-volatile memory,

a processing unit,

initialization means for requesting a download into the first memory of a conversion program stored on a higher level equipment, the higher level equipment being external to the adapter, the conversion program for converting between the higher level protocol and a lower level protocol, the initialization means being stored in the second non-volatile memory for execution by the processing unit,

download means for downloading to the adapter for storage in the first memory the conversion program stored on the higher level equipment, and

a processing unit for executing the conversion program, and

~~a first memory for storing a conversion program for converting between the higher level protocol and a lower level protocol, after being downloaded from a higher level equipment, and for being executed by the processing unit,~~

~~the adapter comprises a second non-volatile memory containing a resident driver program for execution by the processing unit to initialize communication with the higher level equipment~~

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~~using the higher level communication protocol and to subsequently request download of the conversion program from the higher level equipment into the first memory.,~~

the process ~~comprising~~ comprises:

recognizing and storing a partial identifier or a complete identifier of a lower level protocol corresponding to the lower level connecting cable connected to the adapter,

first communicating with the higher level equipment using the higher level communication protocol to transmit the partial identifier or the complete identifier of the lower level protocol, to the higher level equipment, and

a first downloading from the higher level equipment a first conversion program for converting between the higher level protocol and the lower level protocol, into the adapter, said first conversion program corresponding to the partial identifier or the complete identifier of the transmitted lower level protocol.

20. (Previously Presented) The configuration process according to claim 19, wherein, when the lower level protocol identifier transmitted to the higher level equipment during the first identification step is a partial identifier, the process comprises:



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first communicating with the lower level equipment using the first conversion program downloaded during the first downloading in order to define and store a complete identifier of the lower level protocol,

second communicating with the higher level equipment to transmit the complete identifier to the higher level equipment,

second downloading a second conversion program for converting between the higher level protocol and the lower level protocol, into the adapter, said second conversion program corresponding to the complete identifier of the lower level protocol.

21. (Previously Presented) The configuration process according to claim 19, wherein, when the lower level connecting cable is previously connected to the adapter, the process is started when the adapter is connected to the higher level equipment or at the request of the adapter.

22. (Previously Presented) The configuration process according to claim 19, wherein, when the adapter is previously connected to the higher level equipment, the process is started when the lower level connecting cable is connected to the adapter.